To: Davis Zhen, EPA

From: The Pre-RD AOC Group

Subject: DRAFT Field Protocol for Redox Confirmation at Proposed Porewater Stations

Date: May 2, 2018

As discussed during our tech-to-tech meeting on April 17, 2018 regarding proposed porewater stations, EPA requested a revised protocol to measure and confirm redox conditions at these stations. This protocol will be added to the revised porewater sampling field sampling plan and then submitted to EPA for approval. Confirmation of redox conditions includes three steps, each described below:

- Approximately 30 Days Prior: bulk sediment grab sampling for chemistry and hand-held redox probe of sediment profile
- Day 1: redox probe of sediment profile at time of deployment
- Day 30: hand-held redox probe of the porewater vials at time of retrieval

Step 1: Pre-Sampling Sediment Grab Sampling and SPI

In June 2018, a one-day field effort will include collection of co-located sediment grab samples arsenic, manganese, total organic carbon, and percent fines. Grab samples will be analyzed for arsenic to confirm concentrations within background. This step will also include field redox measurements of the retrieved sediment material inside the power grab. These analyses will help confirm the appropriate of sampling locations prior to deployment of the passive samplers.

Co-located sediment samples will be collected in the vicinity of porewater sampling locations. Sediment grab samples will be collected as described in the Surface Sediment Sampling FSP. All results will be collectively considered to confirm that the target area location is appropriate for porewater sampling. Final sample locations will be determined once all data have been evaluated. See Step 2 for the field redox probe.

Step 2: Field Redox Confirmation of Sediment

At each sampling area during deployment (i.e., Day 1) determine the sediment RPD depth profile to confirm reducing conditions as follows:

- Use hand-held ORP Probe calibrated with 1 cm wide neon tape to indicate each 2 cm interval on the probe, up to 30 cm.

- Use power grab to pull up a 30 cm sample to the vessel deck for profiling.
- Slowly push the ORP probe 1 cm into the sediment and allow the reading to stabilize and record the ORP reading in the field notebook.
- Lower the probe in ~2 cm increments, allowing time for the probe reading to stabilize and recording measurements, until a depth of 30 cm is reached.
- Confirm that sampling location has an RPD less than 6 cm. If oxic conditions are encountered at depth, attempt an additional location in the sampling area. If after multiple attempts, a sampling location cannot be found with appropriate RPD, a different proposed sampling area may be used.

Depending on water depth, access, and stability, the ORP probe may be mounted to 25-ft of push rod and deployed/measured in situ. The first four steps will also be conducted during pre-deployment.

Step 3: Redox Confirmation of Porewater

In addition to confirming sediment redox conditions on Day 1 of sampling as described above, one additional peeper will be deployed (4 peepers total per station) and reserved for measuring redox conditions in each porewater vial (5 vertically stacked vials per peeper; see FSP Figure 3) during retrieval using a narrow (< 3 cm diameter) ORP probe as follows:

- Select one peeper from the 4 deployed peepers to be used only for field water quality measurements, including redox.
- Remove the peeper from the Mylar bag, remove the top vial, rinse free of sediment and open the peeper only enough to insert the ORP probe.
- Allow instrument to stabilize and record the ORP measurement on the Sampling Log. Repeat this procedure for each peeper vial until the full depth profile has been measured.
- Evaluate the stack of porewater vial measurements to determine the RPD depth (and hopefully confirm that the RPD less than 6 cm).
- Use this profile data to select which vials will be composited for analyses, targeting only the vials located in the anoxic zone of sediment. These vials are an integrated measurement over the 30-day exposure period.

Last revised by AGF on 5/2/18; saved on Seattle/PDI/technical/porewaterredoxmoethods